

384-1.

# LIGHTING DATA

EDISON LAMP WORKS  
OF GENERAL ELECTRIC COMPANY

GENERAL SALES OFFICE

HARRISON, N. J.

## Residence Lighting



*Information compiled by*  
A. L. POWELL and H. A. SMITH  
*Lighting Service Department.*

Synopsis:	Page
Scope.....	3
Introduction.....	4
Systems of Lighting.....	7
The Home's Workshop.....	8
Kitchen.....	9
Butler's Pantry.....	11
Laundry and Work Bench.....	11
Den or Sewing Room.....	12
Living Room.....	13
Dining Room.....	19
Hall or Reception Room.....	23
Bedroom.....	24
Bathroom.....	26
Porch.....	28
Grounds.....	29
Garage.....	30
Wiring.....	31
Bibliography.....	34
Chart—The Right Lamp to Use.....	36

For information regarding MAZDA lamps and lighting questions, refer to the nearest sales office.

To insure receipt of bulletins, notify the Department of Publicity, Edison Lamp Works of General Electric Company, Harrison, N. J., of any change of address.

NOTE.—At this point it might be well to define a new word which will be used throughout the text. A generic term for fixture or lighting unit has long been recognized as desirable. The Committee on Nomenclature and Standards of the Illuminating Engineering Society, and other bodies, recommend the use of the word "luminaire." It possesses the advantage that it is not coined, but is already in use in the French language in this connection. "Lighting unit" is at best rather clumsy and the term "fixture" scarcely is descriptive. For example, when discussing a new type of plug, the Elexit, the expression "removable fixture" has often been applied. Obviously "fixture" indicates something stationary or fixed, and it is ridiculous to speak of "removable fixtures." Similarly, table and floor lamps are portable and cannot be called fixtures. Luminaire will cover all these cases.

# *Residence Lighting*

*Information Compiled by A. L. Powell and H. A. Smith  
Lighting Service Department*

## *Scope*

A thoroughly comprehensive treatment of residence lighting is out of the question in the space available in a bulletin of this nature; in fact volumes could be and have been written on this subject. There are many ramifications to the question, personal preferences playing a most important part. With the wide variety of decorative treatments of interiors, individuality should be the keynote of successful home lighting and standardization of practice is not feasible, beyond providing for a few fundamental requirements.



FIG. 1

This Night View of the Living Room Illustrates the Adaptability of a Duplexalite. The shade is made of the same material used in the over curtains, but contrasting effects may be obtained just as readily. The 150-watt MAZDA C lamp in the central fixture is supplemented by table, floor and music luminaires

It seems advisable to discuss this subject in the following manner:

- (a) Outline the general requirements of individual rooms.
- (b) Show illustrations of a few typical satisfactory installations.

- (c) Indicate roughly, the principal types of equipments which will give good effects if properly applied.
- (d) Give suggestions which will make such fixtures (luminaires) as are already in service as useful as possible.\*

### *Introduction*

The importance of our lighting is often ignored until the time when the source is cut off and we are left in darkness. However, it is not hard for us to realize that we are as dependent on artificial illumination as our early ancestors were on their fires. We rely on this light for our comfort and convenience after dark, also as a means of preventing crime. The camp fire served as primitive man's artificial illumination and protected him from the attack of wild animals. The earliest portable lamps were the torches used by those in search of lighting more practical than that furnished by the camp fire. Now we have available efficient and flexible light sources, the result of long, scientific research, and consequently lighting plays a more important part in our activities than ever before.

As indicative of this we might quote from a report of the General Science Committee at the High School Conference held at the University of Minnesota, March, 1921.

The purpose of this report is to furnish help to the teachers of General Science. General Science should be organized with reference to the environment in everyday life of the child. In accordance with this thought the following principles are suggested as guides in the organization of General Science:

1. The basis for the organization should be found in human life, not in the subject matter.
2. This life should be that of the pupil, not that of the teacher.
3. This should be the pupil's present life, not his future adulthood.

### OUTLINE OF GENERAL SCIENCE

#### SCIENCE OF THE HOME

1. *Science of the Household*
  - A. Hygiene of the Home.
    - a. Water Supply
    - b. Disposal of Waste
    - c. Lighting
    - d. Heating and Ventilating
    - e. Insect Pests
    - f. Food (Preparation, preservation, care, uses)
    - g. Cleanliness

\* \* \*

Thus, lighting in the home is given third place in a list of some sixty-eight subjects in General Science.

\* In other words, point out the type and size of lamps which should be used in installations which cannot be changed even though inherently poor or mediocre from the standpoint of proper lighting. Some of these are shown on page 36.



When we realize the amount of time that we are dependent on artificial light, it is not surprising that devices which give proper illumination are receiving more and more attention. In the home, the useful and decorative phases of lighting must be combined, neither one being emphasized at the expense of the other. The decoration of a room may be absolutely spoiled or given the final touch of perfection by the lighting effect. Time, care, and considerable money are spent in establishing harmony of the furniture,



FIG. 2

This Day View Illustrates How Thoroughly the Glassware Used on the Light Sources May Conform with the Decoration of the Bedroom. A 50-watt MAZDA lamp furnishes general illumination from the ceiling luminaire. 25-watt all-frosted MAZDA B lamps are used in the wall bracket and boudoir lamp

hangings and room finish, and avoiding any discord between the styles of furniture used. But of what use are these refinements in the matter of the decorations and furniture unless the lighting is such that these elements can be appreciated? It must be remembered that, as a general rule, it is during the hours when we need artificial illumination that we wish the house to appear at its best. Comfortable lighting makes pleasant surroundings enjoyable, but with poor illumination the carefully planned details of the room are negligible.

Physicians recognize the fact that lighting conditions play a highly important part in one's physical welfare. Evidently the eyes are the first members injured by a glaring light source, but an aggravated condition of eyestrain will cause other disorders not so easily traced to the origin. This phase of the lighting question should be given particular thought where children are concerned. The injury that may be done to the eyes while the muscles are still in the formative stage will, in many cases, endure and cause trouble for a lifetime. See Bulletin Index 16, "The Eye as Affected by Illumination."

The most common example of glare causing this condition is that from a lamp not furnished with a shade or reflector. The practice of using a bare lamp is a result of a habit acquired when less efficient light sources were available, and the elements of good lighting less understood. However, with the more brilliant lamps that we use today, it is imperative that shades be used that conceal the filaments from view. Even when the eye is protected from the direct rays of the lamp, we experience, at times, the glare caused by light reflected from polished surfaces of furniture, or from the glossy paper of a book or magazine. A diffuse system of illumination should be used in this case, giving the effect of a large, rather than a concentrated, light source. Another, not so common, mistake in home lighting, is to have extreme contrasts in intensities of light. Such a contrast will exist, for example, when one portable lamp is the only light used in a room. We then have the excessive brightness of a surface immediately under the lamp and comparative darkness in the rest of the room.

Fortunately, with the wide range of sizes of efficient lamps and the number of styles of standard lighting equipment available, it is possible to have extremely effective lighting. The intensity of light desired for any particular purpose can be obtained without the objectionable feature mentioned above. No longer is it necessary to have only one light source in a room. The more reasonable way is to have such a lighting system that it can be readily adapted to the requirements of the people rather than making it necessary for them to adapt themselves to such lighting as happens to be available.

As an example of this, let us consider the living room of an average home. In this room many recreations are enjoyed. Reading requires more light than talking, but music is more enjoyable in what is known as a "half light." If then, we are able to have

the room softly lighted by decorative table lamps with the help of wall brackets, we can produce a general atmosphere of quiet contentment, the portable lamps furnishing illumination for those reading beside them. For a comfortable game of bridge, it is a necessity that each player be able to see his cards easily, without holding his hand to avoid shadows. The most efficient way to furnish equal light for all is to make use of a ceiling luminaire of



FIG. 3

Direct Lighting is Used in This Kitchen. A 75-watt all frosted MAZDA C lamp in a dense opal bowl reflector with close ceiling luminaire and 25-watt similar units on the wall brackets eliminate shadows at the sink and cabinet

the semi-indirect type, which will light the whole room to an even intensity. The advantages of variable lighting are readily appreciated, not only in the living room, but in all other rooms of the home.

### *Systems of Lighting*

There are three general ways of lighting a room, i.e., by direct, totally indirect or semi-indirect illumination. With luminaires of the first class, shades are used that send the dominating light directly down where it is to be used. The dining room dome, the shower fixtures, the pendant wall brackets and the ordinary table lamp, all are examples of this type of lighting.

Just the opposite effect is obtained by using the indirect system because, in that, all the light is directed to the ceiling which in turn acts as a large reflector and distributes the light throughout the room. No dense shadows are created because the light, being reflected from such a large surface, is well diffused. This type of lighting can be obtained from special portable lamps, with inverted reflectors on the tops of bookcases or in wall urns, as well as from ceiling luminaires.

Now, if the inverted bowl instead of being opaque allows some of the light to be transmitted through it, still reflecting a greater portion to the ceiling, we have an example of semi-indirect lighting, another form of this being a translucent reflector on an upright wall bracket.

As the last two types of lighting depend on the ceiling to reflect the light, it is at once evident that the finish of the room is of great importance. The lighter colors are more efficient as reflectors of light than are the darker ones. The cream colored ceilings most commonly seen are about 65 per cent efficient. That is, 65 per cent of the light that falls on them is reflected back to the room. As a general rule, any loss of light by the indirect system is offset by improved quality of illumination and better conditions for seeing.

Not only is the color of the ceiling important, but also light colored walls are most desirable. A room finished in dark tones can never be made bright and cheerful. An irritating contrast in brightness is likely to prevail in such an interior. For further data, see Bulletin Index 15, "Effect of Color of Walls and Ceiling on Resultant Illumination."

As walls and ceilings become dirty, more light is absorbed by the dust and there is correspondingly less available for use. Just as important as keeping the ceiling clean is the maintenance of the luminaire itself. A thin layer of dust readily settles in an inverted bowl and, while it may act as a diffuser of a light source, it acts more as an absorber. Reference is made here to Bulletin Index 14, "Maintenance of the Lighting System."

### *The Home's Workshop*

Of course, we all know that it is easier to work in pleasant surroundings than in some place where the outlook is cheerless or depressing. Every housewife will recall that, on the mornings when the room is flooded with sunlight, the breakfast is a success, while on the dark and gloomy days, the toast burns, the eggs are



either too soft or too hard, and nothing seems to go right. It has been found that in the industries the proper degree of well diffused light increases production, does away with accidents, makes the shop cleaner and helps the workmen to a more cheerful frame of mind. However, this condition is not confined to the factory, for there are rooms in the house where we wish all of the same results. Today, the housewife does not intend spending the whole day in the house working, and therefore the housework must be done in the most efficient manner.



FIG. 4

This Night View Indicates the Possibilities of Good Illumination with Only One Light Source. A 100-watt Mazda C lamp in an enclosing semi-indirect (Keldon) luminaire provides well diffused even illumination of high intensity. Sanitation is more likely to result with a well lighted room. Note the convenient outlet for the iron.

A well lighted kitchen is a pleasant place in which to work. It is in the dark pantry that most of the dishes are broken. Sewing at night is at best a nerve racking process, but good lighting will help materially. The laundry and the work bench in the basement both must be well lighted.

### *Kitchen*

The unfortunate part of the ordinary kitchen luminaire is its inability to be adapted to much improvement. The combination gas and electric stem luminaire places the lamp so low that the only thing it can do is to cast the shadow of the worker on the work. The designer of such a luminaire seems to have the

mistaken idea that the light is wanted on the floor in the center of the room rather than on the stove or sink. Then, too, the glassware that is used is ineffective. There is really little that can be done to improve this luminaire save by the substitution of diffusing bulbs for clear lamps. If satisfactory lighting is desired, this luminaire should be replaced by one which carries the lamp close to the ceiling and is furnished with a glass reflector that will assist in distributing the light around the sides of the room. Of course, if the room is large, this ceiling light will have to be aided in its efforts by wall brackets in the darker parts. The shades used should be of dense opal glass with smooth, easily cleaned surfaces. For places of average dimensions, a 75-watt all frosted or a 100-watt bowl



*Typical Luminaires for the Kitchen Which Will Provide Suitable Lighting if Properly Applied*

enameled MAZDA C lamp in an 8-in. diameter reflector should be used in the ceiling unit, while 25-watt all frosted MAZDA B lamps in 6-in. reflectors will serve on the bracket luminaires. A night view of a kitchen well lighted in this way is shown in Fig. 3. Such a combination will do away with objectionable glaring reflections that a bare light source will give when bright pans are used.

When the ceiling is painted a light color, a semi-indirect system of lighting is effective. With this installation, only the ceiling luminaire is necessary and yet the shadows are reduced to a minimum. Fig. 4 gives us an idea of the appearance of a kitchen when a one-piece, totally enclosing luminaire is used. This has particular advantages in reducing the accumulation of dust. A 100- or 150-watt clear MAZDA C lamp in such a luminaire will provide adequate intensity in the typical kitchen.

A wall switch near the doorway is a most desirable feature, but its absence will not prevent the use of a luminaire hung out of reach, for chain pull sockets with a length of cord and luminous indicator will be used to control the light.

Whatever form of lighting is employed, it is highly important that convenience outlets for the iron, percolator or fan be provided. The position of the outlet to which the iron will be connected merits consideration and should be such that the minimum of shadows is cast on the board both in the daytime and at night.

Another way to make the kitchen as comfortable and as easy to work in at night as it is in the daytime, is the use of MAZDA daylight lamps. The daylight quality of the light not only makes a cleaner looking kitchen, but, just because it is like daylight, stains are more readily visible and therefore the kitchen actually is cleaner.

#### *Butler's Pantry*

If the outlet is not already in place, it is preferable to have it installed directly over the sink. A direct lighting opal reflector, 50-watt MAZDA lamp, close ceiling luminaire, with pull chain socket, may well be used here. When the outlet is already in the center of the room, this type of lighting is not advisable because of the shadows that will be cast by the worker on the sink. Under such conditions, semi-indirect lighting is preferable and a harp type holder used that suspends an opal glass reflector under the lamp. A convenience outlet near the sink is desirable for attaching a small motor for polishing silver or other time-saving devices.

#### *Laundry and Work Bench*

As a usual practice, the washing machine is installed in the basement and artificial illumination will probably be necessary whenever the machine is used. High level illumination is a desirable factor here and MAZDA daylight lamps make it easier to detect stains on linen. The 100- or 150-watt bowl enameled MAZDA C lamps in RLM Standard dome reflectors make an efficient luminaire giving the desirable quality of diffusion and distribution. The type of direct luminaires suggested for the kitchen is also applicable where the laundry is "finished off."

The location of convenience outlets for the washing machine and ironer should be considered with respect to the position of the light source. For hand ironing, an outlet on a drop cord is preferable to one in the side wall or baseboard in giving greater latitude in the work.

The standard methods of bench lighting discussed in Bulletin Index 62, "The Lighting of Metal Working Plants," apply to the cellar work bench, and results similar to those indicated in Fig. 5 can be secured by the application of these principles. Convenience outlets on the bench, itself, for an electrically heated glue pot, a soldering iron, a motor to run a small lathe, are necessary adjuncts.

The lights for the cellar proper should be so distributed as to illuminate the foot of the stairs, the furnace, coal bins and cold pantries. If the ceiling is finished in a light color, flush or surface receptacles with diffusing bulb, low wattage lamps without reflectors will give a wide spread of light at low cost of installation.



FIG. 5

The Work Bench in the Home Should be Lighted by the Methods Similar to Those Used in the Factories. 75-watt diffusing bulb MAZDA C lamps in RLM Standard dome reflectors, successfully diffuse and distribute the light over the bench. Several convenience outlets are provided

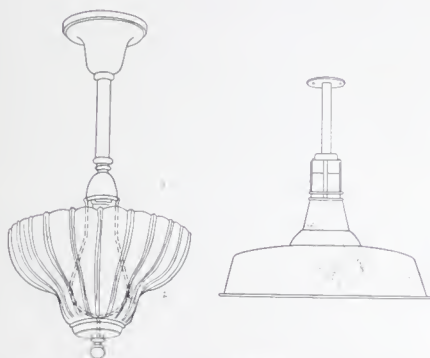
At least one of the cellar lights should be controlled from the head of the stairs and it is desirable to have some sort of a pilot device to indicate whether or not the lamps are burning. A small lamp for this purpose will be noted above the door in Fig. 3.

#### *Den or Sewing Room*

The lighting requirements of these two rooms are so similar that they can well be discussed together. For close work, either in sewing or keeping records, a high intensity of illumination is necessary. For ordinary purposes, however, we do not want to have the whole room as light as this. A combination of lighting is desirable, a central diffusing luminaire to furnish general illumina-



tion of moderate intensity, and a portable luminaire for the close work. An excellent type of adjustable luminaire for sewing at night is to be seen in Fig. 1. This utilizes a 150-watt MAZDA C lamp and a dense blue glass color screen to produce artificial daylight. On the portable luminaire, it is desirable to use a metal or very dense glass reflector, large enough to conceal the lamp from view. Diffusing bulb lamps are of service in preventing disagreeable reflections. The standardized methods of lighting the billiard table are given in Bulletin Index 45, "Lighting of Indoor Recreations."



A Simple Means of Obtaining Semi-indirect Effects from a Direct Lighting Luminaire and the Efficient RLM Standard Dome Reflector for Lighting the Basement and Garage. The porcelain enamel resists attacks of moisture

### *Living Room*

The living room is the scene of the social life of the house, and the lighting of such a room should receive special attention. It must be agreeable and bring out the special points of the decorative scheme. It will not be a full success if it makes people look tired, old or unattractive, by bringing out sharp facial shadows. Into this room novel effects may be introduced that vary the monotony of ordinary lighting. Small lamps burning inside translucent vases render them luminous and show beauties that would otherwise not be noticed. The possibilities in the way of special effects can be utilized only when an adequate number of convenience outlets are available. Ingenuity will soon indicate many expedients by means of which the little touches of color, that aid so much in the appearance of the room, can be introduced at will. It is often

advisable to provide special lighting for paintings, and the discussion on art gallery lighting in Bulletin Index 39, points out the features to bear in mind.

For general lighting, when only one outlet is available, a semi-indirect luminaire will more nearly meet the average requirements than any one type. A lamp of sufficient size can then be used to furnish the necessary intensity and the light will be comfortable



FIG. 6

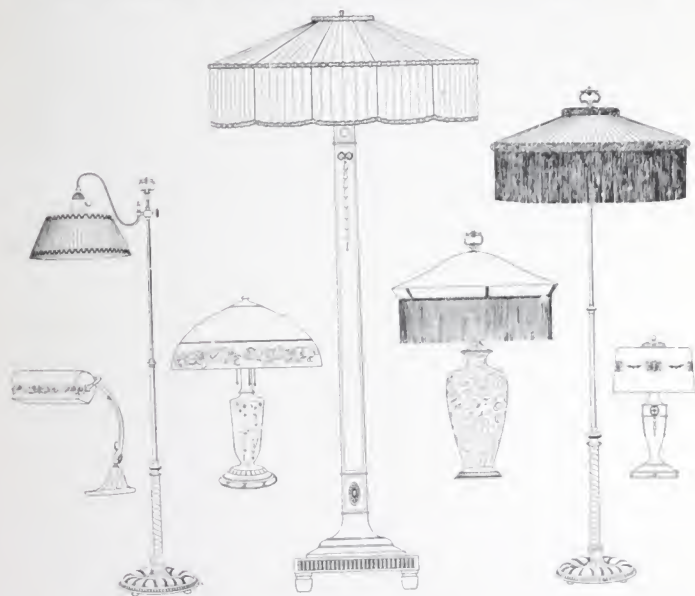
Portable Lamps and Wall Brackets Are Here Utilized to Light the Room in Place of a Ceiling Fixture. Diffusing bulb lamps are used exclusively in the table and floor lamps, with amber toned lamps in the wall luminaires

and devoid of glare, provided the proper design is chosen. The Duplexalite with its adaptability to particular decorative schemes is of especial service in this connection. An example of its use is given in Fig. 1, although in this case the ceiling unit is supplemented by a number of portable luminaires.

A 100- or 150-watt MAZDA C lamp will provide a desirable intensity of illumination with this or a similar luminaire in rooms of average dimensions. To determine the size of lamp desirable for other types, reference should be made to the table on page 36.

There are innumerable period styles of luminaires suitable for the living room. A few typical examples are indicated in the accompanying sketches. In choosing luminaires of this nature, the cardinal points in regard to distribution of light, contrast and direct glare must be kept in mind. Very rarely is it feasible to use lamps without some sort of a shade or diffusing media. Fig. 7 shows the use of a colonial type direct luminaire, where small diffusing shades fulfill the requirements outlined above.

With a suitable number of wall and convenience outlets it is



The Styles of Portable Lamps Giving Good Results Are Innumerable. These are just a few suggestions

good practice to light the living room without a central or ceiling luminaire, and, in this event, table and floor lamps may be used to advantage. Fig. 6 shows such a room as it appears by day. The final touch has been given in this instance by the use of amber toned MAZDA lamps in the wall brackets. Unmodified light emanating from these would show them up in rather severe contrast to the background. The touch of color causes them to blend well with the golden tone of the wall paper.

In Fig. 8 is presented another example of how it is possible to light a room without the use of ceiling luminaires. Large mirrored glass reflectors in the table and floor lamps direct the light to the ceiling making it possible to illuminate the whole room without its unity being broken by anything hanging from the ceiling. Small



A Few Styles of Direct, Semi-indirect and Totally Indirect Ceiling Luminaires Suitable for the Living Room Under Various Conditions

lamps are used to light the shades and furnish some direct light. A number of lighting effects are possible in this room as follows: the wall brackets alone, the indirect units alone, the direct lamps in portables alone, and combinations of any of these. Sheets of colored gelatine may be laid across the inverted reflectors toning the color of light as desired. In this instance care has also been used in choosing the material for the silk shades.



All portable lamps should be chosen with particular thought given to the shades. It is always objectionable to be forced to look at a lamp and the shades must conceal the light sources from one sitting near them. The materials used should be dense enough that the filaments do not show through and as pointed out before, it is always desirable to use diffusing bulb lamps in any kind of a direct luminaire. With skillful selection, a shade will become an integral



FIG. 7

This Luminaire is One Example of the Period Style. 25-watt MAZDA B lamps are shielded by shades that are copies of colonial designs. Well designed luminaires of this kind are extremely useful in completing the decorative plan of a room, provided glare is prevented by the use of shades

part of the color scheme of the room in the evening, as it is during the day. Sometimes, however, a color is used that harmonizes well enough with the drapes and furniture covering but when the shade is lighted, the effect is far from desirable. This danger is most likely to be present when green or blue color schemes are employed. The best solution for such a condition is to have the exterior layer of particularly thin material, such as chiffon or georgette crepe and the lining a rather heavy rose, buff or cream. The resultant light will be toned by the lining and ghastly effects eliminated.

A wall switch is most desirable for controlling the lights in the living room, and it is generally advisable to have the central outlet

and wall brackets on separate circuits. Absence of a wall switch will not make it impossible to use semi-indirect illumination, for small switches can be neatly concealed in the canopy fitting and operated by a fine cord. The living room requires the maximum number of convenience outlets for attaching the portable lamps, electric fan, phonograph motor and special decorative lighting effects.



FIG. 8

Adaptability is the Keynote of the Lighting Shown in This Room. 150-watt MAZDA C lamps are used in inverted reflectors in the portables. 15-watt all frosted MAZDA lamps in the brackets are concealed by shields harmonizing with the wall coverings



Various Means for Lighting the Living Room from the Sidewalls.

### *Dining Room*

This room has lighting requirements peculiar to itself; rarely is it used as anything but a place to eat. The interest therefore is primarily centered on the table and this interest may be increased by having the table lighted in a higher intensity than the rest of the room.



FIG. 8.

The Incident Makes it Possible to Obtain the Advantage of the Old-fashioned Dinner in a Floating Artistic Manner. The table is illuminated in a considerably higher intensity than in the rest of the room. A 30-watt White Mazda being usually adequate, assuming an extra spherical reflector is used.

It is a matter of personal taste which way the dining room shall be lighted, whether by direct or indirect methods. The old style dinner, while often crude and ineffectual, provided a most desirable distribution of light. The table was the brightest spot in the room, yet enough light was transmitted through the glass to illuminate the corners of the room, preventing too great a contrast. There are several requirements which must be fulfilled where a dinner is

employed. It must be hung high enough that one can see the person on the opposite side of the table and yet not so high that the lamps are visible. This will place the bottom of the dome about 56 inches above the floor. A dome can often be made more effective by using a small direct lighting reflector inside of the fabric or glass to send the light downward and conceal the lamp from view. A number of styles of domes have recently appeared on the market



FIG. 10

This Night View of the Dining Room Illustrates the Even Illumination and Absence of Shadows Characteristic of Semi-indirect Lighting. A 150-watt MAZDA C lamp in the Duplexalite gives the above results

much more artistic than those produced in the past, and hence more generally applicable to the home where harmony is sought. An example of the use of one of these is pictured in Fig. 9. A 50-watt White MAZDA lamp will give the desirable intensity on the table top when a dome is employed although in individual instances, higher or lower values are considered more pleasing.

Some people prefer the room more uniformly illuminated and this can be accomplished by the use of the semi-indirect system. By choosing the proper density of glass, a suitable amount of light will be transmitted, the table receiving more light than the surroundings. With the type of semi-indirect luminaire shown in



Fig. 10, it is possible to modify the color of the transmitted light and use a shade which harmonizes with the room finish. For this system, 75-, 100- and 150-watt MAZDA C lamps are applicable, depending on personal preferences as to intensity and on color of surroundings. It is often possible to provide two circuits in a semi-indirect luminaire, one giving the low illumination for setting the table.



FIG. 11

In This Picture is Shown a Combination of Local and General Lighting from the Same Luminaire. 15-watt round bulb frosted MAZDA lamps with silk shades furnish general illumination for the room, while a 75-watt MAZDA C lamp in the center reflector brings the table into prominence

It is also feasible to employ flexible lighting in the dining room. An example of such equipment will be noted in Fig. 11. Here a reflector in the center directs the light from a MAZDA C lamp to the table top—first diffusing it through a glass plate fitting across the mouth of the reflector. Some transmitted light illuminates the room and is supplemented by the light from round-bulb all-frosted lamps in the imitation candlesticks. The small shades soften and tone the transmitted light and, if lined with light material, will act as reflectors. The luminaire is wired with two circuits so that during the dinner just the table is illuminated, while afterwards, as

the spirit expands over a satisfactory meal, the room is more generally illuminated.

Luminaires should not serve as sources of current for cooking devices. A convenience outlet should be installed under the edge of the table, and this, in turn, attached to a floor plug. A baseboard convenience outlet near the buffet or serving table permits the percolator, toaster, or grill to be used without the unsightly collection of cords dangling from overhead, as is too commonly the case.



Some Well Designed Dining Room Units. It is of interest to note the tassel at the bottom of the semi-indirect bowl. This conceals half of an attachment plug for use with cooking devices. The wicker dome carries an opalescent reflector indicated by dotted lines

### *Hall or Reception Room*

Every room in the house has a particular meaning and, as the hall is the first one entered, a feeling of hospitality should prevail. Lighting can be of great assistance in attaining this end.

There are two kinds of halls just as there are two varieties of porches. One is merely an intermission between the front door and the rest of the house, the other of the reception room type.



These Examples are Typical of the Variety of Luminaires That are Suitable for the Reception or Formal Hall

In the first class a moderate intensity of illumination suffices and a 25-watt MAZDA lamp in a suitable diffusing globe close to the ceiling will furnish enough light for removing one's wraps. The upstairs hall has generally the same requirements and may be similarly lighted.

The methods of lighting the living room are quite generally

applicable to the hall of the reception type. In Fig. 17 is given an example of how well the lighting can be planned to harmonize with the architectural features. Urn shaped enclosing globes are also harmonious with many interiors.

The control for hall lighting is important. Three-way switches are most desirable, one near the entrance doorway and the other at a convenient point in the second floor hall. The slight additional expense in installing these is more than offset by the security and comfort gained.



FIG. 12

The Day View of This Bedroom Gives a Good Idea of How Different Materials May be Used in the Lighting Equipment and the Results be Harmonious. The fact that all lamps are concealed from view is indicative of comfortable conditions.

### *Bedroom*

The general arrangement of lighting outlets in the bedroom will depend upon the placement of the furniture. In most cases it is desirable to provide a low intensity of general illumination from a central luminaire, preferably of the semi-indirect type, although frequently silk-shaded direct luminaires are suitable; from 40 to 75 watts are desirable in this unit. It should be controlled by a



wall switch near the entrance doorway to avoid stumbling about the dark in search of the key socket.

A higher intensity of illumination is required at the mirrors or dressing table and this can be obtained by wall brackets or pendant dresser lights harmonizing with the central unit as well



Dainty Decorative Luminaires Suitable for the Boudoir Are Numberless. One should be chosen which blends with the color treatment of the room

as the room decoration. The pendant dresser light as shown in Fig. 13, should be placed slightly in front of the person using the mirror. A convenience outlet near the bed makes it possible to attach a heating pad, or portable lamp for reading in bed. Another near the dresser is useful for attaching an electric curling iron, heater or fan.

The harmony of equipment in the boudoir is very important.

In the example illustrated in Fig. 12, the austere type of architecture is an excellent setting for the formality of the parchment used on the semi-indirect and wall luminaires. The bedroom pictured in Fig. 2 is daintily finished with a floral decoration, and the glassware on the center luminaire, wall bracket and boudoir lamp has flowers as a component part of its treatment.

Where the closet is in such a position that it does not receive light from the room itself, a simple type of receptacle should be provided close to the ceiling with a low wattage, diffusing bulb MAZDA lamp. A door switch for such a position is a convenience and an economy.



FIG. 13

When Glassware is Used, the Color and Design Should be in Agreement with the Decoration of the Room. This picture shows shades on the bracket and dresser light of parchment finish that harmonizes with the delicate yellow of the wall paper

### *Bathroom*

The mirror is the point of particular interest in this room and the lighting must be planned with this in mind. The face must be well illuminated before it can be viewed in the mirror. Wall luminaires, one on each side, will provide satisfactory illumination for shaving. The 15-watt diffusing bulb MAZDA lamps in either pendant

or upright shades may be used. A lamp in a simple diffusing globe close to the ceiling may be used for general illumination where additional light is necessary. Care should be taken in locating the lighting outlets in the bathroom in order that shadows of the occupant of the room will not be cast on the window. Convenience outlets are necessary for the electric heater, curling iron, hot water mug or vibrator.



Neatness and Simplicity Are Expressed in Such Luminaires as These Applicable to the Bathroom, Closets and Passageways Respectively



Parchment, Silk and Glass Are Media for Directing and Diffusing the Light. Here They Are Applied in Neat Dresser Luminaires

### *Porch*

In order that the home may invite one's friends and repel intruders, the porch should be well illuminated. A porch often serves merely as an entrance, but may act as an outdoor living room. Of course in these two cases radically different lighting will be employed. In the first type, only a small amount of illumination is required for safety and to enable one to see the name plate, doorbell or button. A 10-watt MAZDA lamp will burn for a long



FIG. 14

The Indirect Light Sources in This Sunroom Are Inconspicuous by Day and Add to the Decoration When Lighted. 40-watt lamps in metal reflectors are concealed by the artificial flowers in the wire baskets

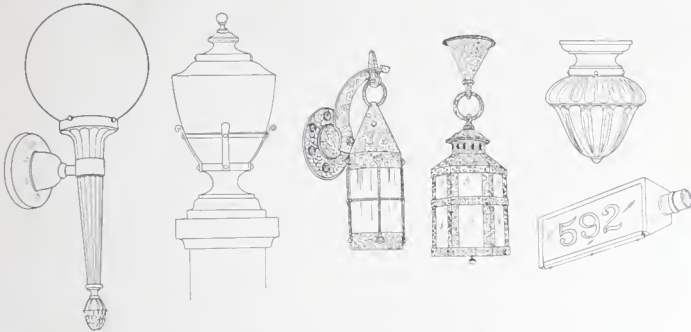
period at a very low cost and serves excellently on the porch in a weatherproof type enclosed globe, lantern fixture, or luminous house number. An outlet is also necessary at the rear porch or service entrance. In the large porch or sunroom, much novelty can be introduced. Indirect luminaires of metal or actual wickerwork lined with cretonne or tinted glassware are suitable in introducing a touch of color harmony. Artificial or natural flowers or vines can be effectively applied as exemplified in Fig. 14. Convenience outlets on the porch for attaching portable lamps or



other devices should be of the weatherproof type and located in such positions that they will not collect moisture.

### *Grounds*

While the subject of lighting the grounds is particularly of interest to those having suburban homes, there are still many parts of cities where the street lighting may be supplemented by a lamp at the entrance of the driveway. This light acts as a welcome



The Luminaire for the Porch Need Not be of a Crude Afterthought Nature, but Can be Distinctive at a Small Additional Cost

to guests, as a means of protection and also will contribute to the appearance of the property. The use of an ornamental standard that matches the architectural style of the house, with an opalescent glass globe or lantern type luminaire, is good practice. A 50-watt MAZDA lamp in this will enable the driver of an automobile to see the entrance clearly.

When the driveway is of considerable length, it becomes necessary to place lights at least at sharp curves or particularly dark spots. The size of the lamps used will depend upon the surroundings but MAZDA lamps ranging from 25 to 75 watts should fulfill all requirements. It is necessary that these lamps be used on standards that will raise them above the direct line of view of the driver. The glassware used should minimize glare in the driver's or pedestrian's eyes.

The greenhouse or fountain lighting offers opportunities for special effects that are beautiful and unique. Colored lights may be used that will render the view at night far more interesting than by day as evidenced by Fig. 15.

Concealed light sources are effective for illuminating banks of ferns or rocks. For general illumination of the greenhouse, lamps in opal reflectors should be installed close to the ceiling.

Sports are now pursued at night with as much enjoyment as in the daytime, due to the modern methods of lighting. Data on lighting the tennis court are obtainable in Bulletin Index 93, "The Lighting of Outdoor Sports."

Care must be taken to use weatherproof fittings for all fixtures that are to be used out-of-doors. Outlets should be provided on the outside of the house to facilitate the decoration of the grounds for special occasions.



FIG. 15

The Grounds of a Suburban Residence with Pleasing Decorative Lighting Effects.

The lanterns fitted with rippled amber glass illuminate the walks and cascades.

The fountain is lighted by three sets of three color lights—one set behind the falling water, one at the center of the pool, and one at the front of the pool. Concealed lamps in urns illuminate the face of the stone work. A flasher in the basement of the house causes the effects to be constantly varied

### *Garage*

Electric light is a necessary adjunct to the garage in reducing the fire hazard, promoting safety and making adjustments and repairs in a satisfactory manner. General illumination should be

furnished by one or more overhead luminaires, depending on the size of the structure. Bowl enameled MAZDA C lamps in steel reflectors, porcelain enameled, of the dome type, are desirable for this service. They should be controlled by a wall switch near the entrance. Several convenience outlets are also necessary with a number of re-enforced cords, MAZDA mill type lamps and wire guards, as portable lights. In working on the engine and transmission, such equipment proves of value. The method of bench lighting pictured in Fig. 5 can be effectively applied.

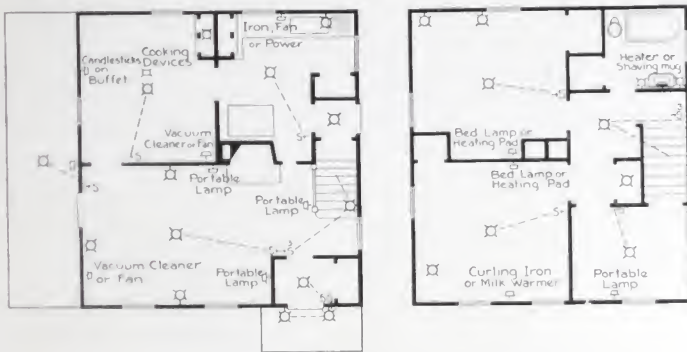


FIG. 16  
Layout of Outlets for a Typical Small House

## Wiring

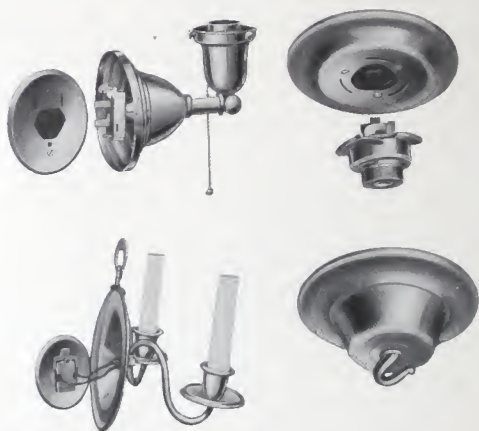
The standards for proper wiring from a protective basis are established by local underwriter's codes and ordinances. These must be adhered to. The choice between different systems is governed largely by economic considerations and need not be discussed here.

Attention should be directed to the desirability of making the initial installation complete. A given amount of installation work can be done at much less expense when doing the original work than at a later date. The mistake is often made of omitting convenience outlets and wall switches in order to keep down the cost of wiring. This will certainly be regretted when one begins to appreciate that some of the real advantages of electric service are lost.

The statement can be made with a reasonable degree of certainty that "one cannot have too many outlets." The errors in practice are all in the other direction. A satisfactory layout for the average home would be such as pictured in Fig. 16.

A feature which should be incorporated in each house wired in the future is the use of the Elexit or the standardized luminaire receptacle. This device makes it possible to "hang a fixture like a picture" and one can change bracket or ceiling luminaires at will, without the often prohibitive delay and expense of calling in an electrician to make any connections.

It will be as simple to move a fixture from one room to another as it now is to move a table lamp. A person living in a rented home



The "Elexit" for Rigid and Flexible Types of Wall Brackets and Ceiling Luminaires

need not be content with the lighting that happens to be installed but can use his own distinctive, individual fixtures, just as he does his pictures, draperies, and furniture.

The special wiring devices which add materially to the convenience of the installation are almost innumerable. Among them might be mentioned:

The switch handle or small indicator on a pull chain socket provided with luminous material which glows in the dark, making it possible to locate the control readily.

Switches with small lamps concealed in their mechanism which serve to indicate that the attic or cellar lights are burning. Buzzing devices serve the same purpose.

Switches which can be attached to the ceiling or concealed in a canopy where wall switches are missing and it is not deemed advisable to do any extensive wiring.



Three-way switches for controlling the light from two points.

Two or more circuit switches in one mechanism to produce various degrees of lighting by pushing or turning the button a certain number of times.

Switches which operate automatically when a closet door is opened or closed.

Master switches for lighting the whole house from the owner's bedside in case of emergency.



The Standard Receptacle and a Convenience Outlet in Use

Convenience receptacles which can be installed in the wall, baseboard or floor or under a table. These should be of the standard type to take a plug with  $\frac{1}{4}$ -in. parallel blades spaced  $\frac{1}{2}$ -in. apart so that all plugs are interchangeable.

Bell ringing transformers which do away with maintaining batteries for this purpose.

Toy transformers which can be used to provide a low voltage circuit that can be safely used in the nursery for children's electric toys.

Sockets to convert candlesticks so that they will serve as electric lamps.

New devices of this nature are constantly being developed and the adaptability of electric service continually broadening in scope.






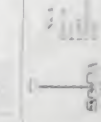



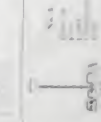



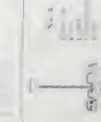



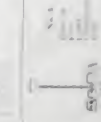



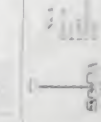
FIG. 17

Many Times the Lighting Equipment Can Produce Proper Illumination and at the Same Time Emphasize the Architectural Features. 25-watt all-frosted MAZDA B lamps are used in the wall luminaires of this hall

### *Bibliography*

- <sup>1</sup>"Residence Lighting," James R. Cravath, Trans. I.E.S., Vol. 1, page 164.
- <sup>2</sup>"Fixture Location in Residence Lighting," F. N. Olcott, Trans. I.E.S., Vol. 1, page 344.
- <sup>3</sup>"Residence Fixtures and Lighting," R. C. Spencer, Trans. I.E.S., Vol. 2, page 127.
- <sup>4</sup>"Fixture Design from the Standpoint of an Illuminating Engineer," V. R. Lansingh and C. W. Heck, Trans. I.E.S., Vol. 2, pages 728 and 784.
- <sup>5</sup>"The Relation of Architectural Principles to Illuminating Engineering Practice," Bassett Jones, Jr., Trans. I.E.S., Vol. 3, page 9.
- <sup>6</sup>"Light and Color in Decoration," George Leland Hunter, Trans. I.E.S., Vol. 3, page 190.
- <sup>7</sup>"Lighting Fixtures from a Manufacturer's Point of View," F. C. Dickey, Trans. I.E.S., Vol. 3, page 264.
- <sup>8</sup>"The Relationship of Decoration to the Illuminating Engineering Practice," C. R. Clifford, Trans. I.E.S., Vol. 5, page 179.
- <sup>9</sup>"The Relation of Fixture Design to Modern Illuminating Engineering Practice," L. R. Hopton and H. E. Watkins, Trans. I.E.S., Vol. 5, page 301.
- <sup>10</sup>"Some Phases of the Illumination of Interiors," Preston S. Miller, Trans. I.E.S., Vol. 8, page 99.
- <sup>11</sup>"Home Lighting," G. L. Hunter, Trans. I.E.S., Vol. 8, page 149.
- <sup>12</sup>"The Lighting of a Simple Home," A. L. Powell, Trans. I.E.S., Vol. 9, page 45.
- <sup>13</sup>"The Design of Combination Fixtures," C. A. Peterson, Trans. I.E.S., Vol. 9, page 67.
- <sup>14</sup>"The Relation of the Illuminating Engineer to the Problems of Fixture Design," A. B. Wilson and F. J. Blaschke, Trans. I.E.S., Vol. 9, page 203.
- <sup>15</sup>"Art and Science in Home Lighting," G. W. Cassidy, Trans. I.E.S., Vol. 10, page 55.
- <sup>16</sup>"Knowns and Unknowns in the Lighting of Small Interiors," J. R. Cravath, Trans. I.E.S., Vol. 10, page 303.
- <sup>17</sup>"The Relation of Lighting to Architectural Interiors," Morgan Brooks, Trans. I.E.S., Vol. 11, page 539.
- <sup>18</sup>"Some Problems in the Design of Lighting Fixtures," S. DeKosenko, Trans. I.E.S., Vol. 12, page 78.
- <sup>19</sup>"Home Lighting—How to Make it Comfortable and Effective," A. L. Powell and R. E. Harrington, Trans. I.E.S., Vol. 14, page 394.
- <sup>20</sup>"What the Illuminating Engineer Can Do for the Fixture Manufacturer," W. R. McCoy, Trans. I.E.S., Vol. 15, page 243.

- "Artificial Lights and Their Fixtures in Japan," Motoo Uchisaka, Trans. I.E.S., Vol. 15, page 257.
- "Central Station Methods for Securing High Standards in Old Homes," O. R. Hogue, J. J. Kirk and E. D. Tillson, Trans. I.E.S., Vol. 15, page 693.
- "Electric Illumination of the Home," F. A. Vaughn, *Electrical Review*, June 1, 1912.
- "Methods of Home Lighting," *Journal of Electricity, Power and Gas*, January 17, 24, 31, and February 7, 14, 1914.
- "Flexibility in Residence Lighting," *Electrical Review*, April 25, 1914.
- "The Lighting of Our Homes," J. C. Hobrecht, *Journal of Electricity, Power and Gas*, May 23, 1914.
- "Handling the Small Consumer in Europe," S. E. Doane, *Electrical World*, May 23, 1914.
- "Elements of House Wiring," *Electrical Record*, November, 1914.
- "Specification Form for Residence Wiring Used by Electrical Board of Minneapolis," *Electrical Review*, June 26, 1915.
- "Common Sense in Residence Lighting," A. L. Powell, *Lighting Journal*, September, 1915.
- "Electric Fixtures for Residential Rooms," *Electrical Record*, September, October and November, 1915.
- "The Library Lamp," M. Luckiesh, *Lighting Journal*, December, 1915.
- "Bathroom Lighting," H. T. Spaulding, *Lighting Journal*, January, 1916.
- "Simple Methods of Spotlighting in the Home," H. E. Ives, *Lighting Journal*, June, 1916.
- "Modern Practice in Residence Lighting," J. R. Cravath, *Electrical Review*, September 2, 1916.
- "A Departure in Residence Lighting," E. J. Dailey, *Lighting Journal*, February, 1917.
- "Lighting the Average House," A. L. Powell, *Electrical Merchandising*, August, 1917.
- "Report of the Illuminating Engineering Society's Committee on the Lighting of Small Houses," *Electrical Contractor-Dealer*, December, 1918.
- "Linking Science and Art," M. Luckiesh, *Electrical Review*, October 5, November 2, December 7, 1918 and January 4, 1919.
- "Dining Room Fixture Giving Variety of Effects," *Electrical Merchandising*, January, 1919.
- "Wiring Chart for House Lighting," *Electrical Review*, March 8, 1919.
- "Electricity in Household Service," Part 2, E. J. Edwards, *General Electric Review*, March, 1919.
- "Dining Room Lighting," H. T. Spaulding, *Lighting Journal*, January, 1915.
- "Lighting and the Householder," M. Luckiesh, *Electrical Review*, March, 12, 1920.
- "Lighting Effects vs. Lighting Fixtures," M. Luckiesh, *Electrical Review*, March 27, 1920.
- "Lighting of the Living Room," M. Luckiesh, *Electrical Review*, April 10 and April 24 1920.
- "Wiring of a Middle Class Home," M. Luckiesh, *Electrical Review*, June 12, 1920.
- "Lighting and the Household Budget," M. Luckiesh, *Electrical Merchandising*, June 19, 1920.
- "Portable Lighting Furniture," M. Luckiesh, *Electrical Review*, July 10, 1920.
- "Miniature Lamps in the Home," M. Luckiesh, *Electrical Merchandising*, Feb., 1921.
- "Lighting Requirements Modern Dining Room," F. W. Mathieu, *Electrical Review*, May 14, 1921.
- "Wired Furniture," *Electrical Merchandising*, October, 1921.
- "Installation of Elexits Requires No Special Fittings," B. Tousley, *Electrical Review*, October 22, 1921.
- "Lighting Fixtures," E. L. Caldwell, Lectures on Illuminating Engineering, *Johns Hopkins Press* 1910.
- "Art of Illumination," Louis Bell, Chapter X, 1912, page 207, *Domestic Illumination*, 2d Edition.
- "The Lighting of the Home," H. W. Jordan, *Illuminating Engineering Practice*, University of Pennsylvania, 1917.
- "Artificial Light, Its Influence on Civilization," M. Luckiesh, The Century Co.
- "Lighting the Home," M. Luckiesh, The Century Co.
- "The Lighting Art," F. L. Godinez.

GENERAL TYPE OF LIGHTING FIXTURE				Small Room (9' x 12' or less)	Medium Room (Approx. 12' x 15')	Large Room (15' x 20' or more)
				15-watt All Frosted MAZDA B LAMPS	25-watt All Frosted MAZDA B LAMPS For indirect outlets Same size of lamps should be used as in other indirect units	40-watt All Frosted MAZDA B LAMPS
				For pendant type outlets		
				Single outlet—50-watt WHITE MAZDA LAMP		
				Double outlet—40-watt All Frosted MAZDA B LAMPS		
				Triple outlet—25-watt All Frosted MAZDA B LAMPS		
				Four outlets—15-watt All Frosted MAZDA B LAMPS		
				When no ceiling fixture is used—50-watt WHITE MAZDA LAMP		
				When ceiling fixture is used—25-watt All Frosted MAZDA B LAMP		
				For passage ways, halls or decorative lighting—10 or 15-watt All Frosted MAZDA B LAMP		
				Single outlet—25-watt Round Bulb, All Frosted MAZDA B LAMP		
				Double outlet—15-watt Round Bulb, All Frosted MAZDA B LAMPS		
				To halls and passage ways—15 or 25-watt MAZDA B LAMP		
				For general porch lighting—40 or 50-watt MAZDA B LAMP		
				For entrance or entrance light—10 or 15-watt MAZDA B LAMP		
				Single outlet—50-watt WHITE MAZDA LAMP		
				Double outlet—40-watt All Frosted MAZDA B LAMPS		
				Triple outlet—25-watt All Frosted MAZDA B LAMPS		
				Double outlet—50-watt WHITE MAZDA LAMPS		
				Triple outlet—40-watt All Frosted MAZDA B LAMPS		
				Four outlets—25-watt All Frosted MAZDA B LAMPS		

197